

# FACT SHEET

# LYME DISEASE



## WHAT IS LYME DISEASE (LD)?

Lyme disease is an infectious disease that often begins with a characteristic rash, and which can later involve the joints, nervous system and/or heart. It is caused by a spiral-shaped bacterium (spirochete) called *Borrelia burgdorferi* that is transmitted to humans by the bite of an infected tick.

## WHERE IS LD FOUND?

In 1975, investigation of an unusual prevalence and geographic clustering of children with arthritis in Lyme, Connecticut led to the discovery of this illness. It is now known that LD occurs over wide areas of the United States. The most severely affected areas are the Northeast from Massachusetts to Maryland, the upper Midwest around Wisconsin, and the West Coast around California. Cases have been reported in most other states, however, as well as in many other parts of the world, particularly Europe and Asia. Lyme disease is the most prevalent arthropod-borne illness in the United States.

## HOW IS LD TRANSMITTED?

Lyme disease is transmitted by the bite of certain ticks. The known tick transmitters (or vectors) of the Lyme disease pathogen are the blacklegged tick (*Ixodes scapularis*, also commonly known as the "deer tick") in the East and Midwest, and a closely related species, the western blacklegged tick (*Ixodes pacificus*), in the West. In either case, the tick is smaller than both the well-known American dog tick (*Dermacentor variabilis*) and lone star tick (*Amblyomma americanum*), and the immature stages are extremely tiny. The ticks cling to low-lying vegetation; they are not found in trees, and they do not jump or fly. They are most numerous in wooded areas, leaf litter, high grass, weeds and brush. The tick's two-year life cycle requires that the tick feed (take a blood meal) on three separate hosts. These hosts include a variety of animals, including birds, but white-footed mice and deer are preferred. *Borrelia burgdorferi* is acquired by the first immature stage of the tick (larva) as it feeds on the blood of an infected animal, usually a mouse. The larva molts to become an infected nymph, which crawls up vegetation and is transferred by direct contact to the skin of a passing animal or human. This infected nymphal tick can then transmit the pathogen as it feeds on the new host. Thus, the greatest chance of becoming infected by a tick bite occurs during May through July, the period of greatest nymphal tick activity in most areas. Adult ticks are active during the fall and early spring. They feed mainly on deer but may also bite, and infect, humans. Once the adult female tick has fed, she lays a cluster of 2,000-3,000 eggs in the leaf litter. These eggs hatch into larvae in the summer, and the life cycle begins anew. It is important to remember that not all ticks carry Lyme disease, so a tick bite does not necessarily mean that disease will follow. In addition, prompt removal of a tick will lessen your chance of getting sick even if the tick is infected, because studies have shown that 24-48 hours of feeding is required before transmission of *B. burgdorferi* can occur. Ticks that are just crawling on you cannot transmit disease.

## WHAT ARE THE SYMPTOMS OF LD?

Early -- The first symptom of LD is usually a skin rash called erythema migrans (EM) that occurs at the site of the tick bite within 3 days to one month following infection. The tick itself may go undetected. The rash begins as a small red spot, which gradually enlarges as spirochetes spread locally in the skin. Oftentimes the lesion has partial clearing in the center so that it resembles a donut or bull's-eye, and it usually expands to at least several inches in diameter, sometimes up to as much as 12 inches. It is flat, not raised. Although the skin rash is occasionally described as hot or itchy, it usually has no sensation associated with it and may therefore go unnoticed, particularly if it is located on a part of the body that is difficult to see. While the rash is generally red in color on light skin, it may appear more like a bruise on dark-skinned individuals. Up to 40% of people with LD may not have the early skin rash. Other common early signs of LD - with or without the rash - are flu-like symptoms such as significant fatigue, headache, sore and aching muscles and joints, fever, headache, sore throat, stiff neck and swollen glands. The eyes may sometimes be affected (conjunctivitis). If left untreated, these early symptoms of LD may disappear on their own over a period of weeks; however, this does not necessarily mean that the disease has cleared up, and serious complications could arise later. On the other hand, if promptly treated with appropriate antibiotics, the skin rash and flu-like symptoms go away within days, and complications can usually be avoided.

Disseminated -- Later symptoms of Lyme disease can begin to appear shortly after the initial symptoms or not until weeks to months later. These symptoms may include complications of the joints, the nervous system, and the heart. Rash may recur as multiple secondary lesions on parts of the body other than the bite site in about 50% of untreated people.

Symptoms in the joints occur in up to 60% of untreated people, and primarily consist of an arthritis that affects the large weight-bearing joints such as the elbow, wrist, and especially the knee. Pain, swelling or stiffness can move from joint-to-joint, and may persist for months to years.

Neurologic complications occur in 10-20% of untreated people. The most common symptoms include facial paralysis (Bell's palsy or other cranial nerve palsies), severe headache and stiff neck (meningitis), memory problems, sleeplessness and irritability (encephalopathy), and weakness and/or pain in the chest or extremities (radiculoneuritis). These symptoms can fluctuate in severity, and may persist for weeks, months, or years.

Heart symptoms occur in 6-10% of untreated people. Electrical conduction in the heart may be affected (heart block), sometimes requiring temporary insertion of a pacemaker, and inflammation of the heart muscle (myocarditis) may occur.

## **HOW IS LD DIAGNOSED?**

Diagnosis is based primarily on recognition of the typical symptoms of LD such as the characteristic skin rash or flu-like symptoms, particularly if they occur in the spring or summertime, or if the individual has had a known exposure to ticks or tick habitat in an area of the country where the disease is known to occur. **PROMPT TREATMENT OF EARLY SYMPTOMS MAY PREVENT LATER AND MORE SERIOUS PROBLEMS.**

Atypical cases, or cases presenting with only disseminated stage complications, can sometimes be very difficult to diagnose. In these persons, a blood test looking for antibodies to the causative bacteria is often helpful. It should be noted that early in the disease, this blood test may be negative even though infection is present. This is because it takes a while for the body to develop a detectable level of antibodies; as LD progresses, antibody levels rise and the test becomes more reliably positive.

## **WHAT IS THE TREATMENT FOR LD?**

Oral antibiotic treatment works best early in the illness, clears up infection, and often prevents later complications. Doxycycline and amoxicillin are the most effective oral antibiotics. In children, amoxicillin is preferred (erythromycin may be substituted, although it may be less effective). For some disseminated stage complications, including meningitis and third-degree heart block, administration of high-dose intravenous antibiotics such as ceftriaxone is often required.

## **HOW CAN LD BE PREVENTED?**

Knowledge of where these ticks are found, avoidance of such areas when possible, use of protective clothing and repellents, and if bitten, prompt removal of the tick, are the primary preventive measures. Persons living in areas where ticks are prevalent, or where LD or other tick-borne illnesses occur, should follow these guidelines:

If you walk in tick habitat (tall grass and weeds, scrubby areas, woods and leaf litter), wear a long-sleeved shirt, long pants, and high socks. Tuck your shirt into your pants and pant cuffs into your socks. Light colored fabrics make it easier to detect ticks that are crawling on your clothing.

Use a repellent containing permethrin on your clothing and a repellent containing deet (N,N-diethyltoluamide) on your exposed skin.

Routinely check your skin and clothing for ticks while you are outdoors in tick habitat, and do a careful check of your whole body once you come indoors. The ticks can be very small. Look for new "freckles" or moving specks of dirt.

To remove a tick, use fine-tipped tweezers to firmly grip the tick's mouthparts as close to the skin as possible. Pull back slowly and steadily with firm tension. Be patient - the tick's central mouthpart called the hypostome is covered with sharp barbs, sometimes making removal difficult. Don't pull back sharply, as this may tear the mouthparts from the body of the tick, leaving them embedded in the skin. If the mouthparts do break off, don't panic - the mouthparts alone cannot transmit LD because the infective body of the tick is no longer attached. However, to prevent secondary infection, remove the mouthparts as you would a splinter. **DON'T SQUEEZE THE BODY OF THE TICK**, as this may force infective fluid into the wound site.

After removal, wash the wound and apply an antiseptic. **SAVE THE TICK** in the event that symptoms arise, because identification of the tick may facilitate a physician's diagnosis and treatment. You can preserve the tick by placing it in a clean, dry jar or other container, and keeping it in your freezer.

Be aware of the symptoms of Lyme disease. **IF YOU HAVE BEEN IN AN AREA WHERE THE TICK IS FOUND AND YOU DEVELOP SUCH SYMPTOMS, PARTICULARLY THE SKIN RASH AND/OR 'FLU' SYMPTOMS DURING THE PERIOD FROM MAY THROUGHOUT EARLY FALL, YOU SHOULD PROMPTLY SEE A PHYSICIAN FOR EVALUATION.**



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